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Clinical Outcomes and 90-Day Costs Following Hemiarthroplasty or Total Hip Arthroplasty for Hip Fracture

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ABSTRACT

Background: In the era of bundled payments, many hospitals are responsible for costs from admission through 90 days postdischarge. Although bundled episodes for hip fracture will have a separate target price for the bundle, little is known about the 90-day resource use burden for this patient population.
Methods: Using Medicare 100% Standard Analytic Files (2010-2014), we identified patients undergoing hemiarthroplasty or total hip arthroplasty (THA). Patients were aged 65 and older with admitting diagnosis of closed hip fracture, no concurrent fractures of the lower limb, and no history of hip surgery in the prior 12 months baseline. Continuous Medicare-only enrollment was required. Complications, resource use, and mortality from admission through 90 days following discharge (follow-up) were summarized.
Results: Four cohorts met selection criteria for analysis: (1) hemiarthroplasty diagnosis-related group (DRG) 469 (N = 19,634), (2) hemiarthroplasty DRG 470 (N = 77,744), (3) THA DRG 469 (N = 1686), and (4) THA DRG 470 (N = 9314). All-cause mortality during the study period was 51.6%, 29.5%, 48.1%, and 24.9% with mean 90-day costs of $28,952, $19,243, $29,763, and $18,561, respectively. Most of the patients waited 1 day from admission to surgery (41%-51%). Incidence of an all-cause complication was approximately 70% in each DRG 469 cohort and 14%-16% in each DRG 470 cohort.
Conclusion: This study confirms patients with hip fracture are a costly subpopulation. Tailored care pathways to minimize post-acute care resource use are warranted for these patients.
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Hip fracture places a substantial resource burden on the US healthcare system. Each year more than 250,000 people over the age of 65 are hospitalized for hip fracture [1], and this number is projected to increase with the aging of the population. Currently, the US healthcare system is rapidly shifting away from a fee-for-service system to quality-based care. This shift is most evident in the implementation of Medicare's Bundled Payments for Care Improvement Initiative (BPCI), the Comprehensive Care for Joint Replacement (CJR) model, and the recently passed surgical hip/femur fracture treatment model. For hospitals enrolled in CJR or BPCI, hospitalizations grouped under diagnosis-related group (DRG) 469 (major joint replacement of the lower extremity with major complications or comorbidity) or 470 (major joint replacement of the lower extremity without complications or

comorbidity) "trigger" a bundled payment episode. DRGs are sufficiently broad to include hospitalizations for both elective THA and arthroplasty due to hip fracture [2].

Given this shift in payment policy, there is a need to establish mean outcomes and costs incurred over the entire episode of care for patients admitted for hip fracture on a population level. Although Medicare has stated that a separate target price will be set for hip fracture patients vs those undergoing elective THA, there is a paucity of information on this high-cost, high-risk patient population. This study aims at estimating the total resource use and cost among Medicare patients admitted for hip fracture from point of admission through 90 days postdischarge.

Methods

Overview and Data Source

This retrospective database analysis used healthcare claims data from the Centers for Medicare & Medicaid Services (CMS) 100% Limited Data Set (LDS) research files (2010-2014) to identify

patients undergoing hemiarthroplasty or THA for hip fracture. CMS LDS files contain de-identified beneficiary-level health information, compliant with the Health Insurance Portability and Accountability Act (HIPAA Privacy Rule).

Patient Selection and Study Time Period

To best evaluate differences in outcomes by procedure type while accounting for the separate target episode prices for DRG 469 vs 470, 4 study cohorts were created: (1) hemiarthroplasty grouped as DRG 469, (2) hemiarthroplasty grouped as DRG 470, (3) THA grouped as DRG 469, and (4) THA grouped as DRG 470.

Patients were included in this analysis if aged 65 or older, with Medicare-only insurance coverage, with an admitting diagnosis of hip fracture and principal procedure of hemiarthroplasty or THA. The date of admission with diagnosis of hip fracture was defined as the index date for analysis; a baseline period was defined as the 12 months before the index date with follow-up defined as the discharge date plus 90 days. Patients were excluded if they had history during the baseline period of a primary or revision hip arthroplasty procedure, diagnosis of cancer, concurrent diagnosis of other fractures of the lower limbs, and/or open femoral neck fractures (to eliminate fractures due to high-velocity trauma), or any form of supplemental Medicare-Advantage insurance. Continuous Medicare enrollment was required over the 12-month baseline through the index hospitalization discharge date. In order to account for "catastrophic cost" patients, which CMS has ruled will not impact CJR episode target prices [3], patients were excluded from analysis if their total 90-day cost was 2 standard deviations or greater above the mean within the study cohort.

Study Measures

This study summarized patient demographics, clinical history and comorbidities listed during baseline, inpatient complications and initial length of stay (LOS), days from admission to surgery, discharge destination, readmissions, mortality, and total costs over the 90-day episode of care. Days from admission to surgery was defined as the date on the Medicare claim for an arthroplasty procedure code, therefore may not be as precise as procedure time information listed in a full electronic health record. Costs provided in this dataset refer to the Medicare total claim amount paid. Follow-up post-acute care costs were summarized conditional upon a patient staying in a facility of interest (ie, conditional means). Follow-up costs were summed from the day of discharge through 90 days for each discharge destination of interest (inpatient rehabilitation facility [IRF], skilled nursing facility [SNF], home with home health), with costs summed over the entirety of follow-up (ie, capturing multiple stays if multiple stays occurred). Total 90-day costs included the sum of total index hospitalization cost, total readmission cost, outpatient visit costs, and post-acute care costs (IRF, SNF, home health), presented as an unconditional mean (ie, an average across the entire study cohort—regardless of specific post-acute care utilization). Finally, all post-acute care costs were only calculated for patients who survived through at least 90 days follow-up, in order to accurately capture all costs occurring during that time period. This methodology provides conservative estimates of total post-acute care costs as patients who died during follow-up almost certainly had greater healthcare utilization; however, the cost information associated with these patients also had greater potential for missing information. All costs were inflation-adjusted to 2014 USD using the medical care component of the consumer price index.

Data Analyses

Descriptive analyses were conducted for all study measures outlined above, including mean, median, and standard deviation values for continuous measures and proportions for binary measures. Statistical significance testing compared baseline demographic and clinical characteristics between the hemiarthroplasty and THA groups, using the chi-square test for categorical variables (or Fisher exact test for cell counts <10) and Kruskal-Wallis test for continuous variables.

Cox proportional hazards models were constructed to evaluate predictors of a hospital readmission within 90 days, controlling for age group, sex, region, hospital size, fracture type, DRG grouping, selected comorbid diagnoses, history of long-term anticoagulation use, presence of an all-cause complication during the index hospitalization, presence of a transfusion during the index hospitalization, index hospitalization LOS, days to surgery from admission, and initial discharge destination. Additionally, Cox models were performed to evaluate predictors of mortality during the index hospitalization or over 90 days follow-up using the same set of covariates. All analyses were performed using the Instant Health Data Suite (Boston Health Economics, Inc, Waltham, MA) and SAS software (version 9.2, SAS Institute, Cary, NC) packages.

Results

Demographics and Clinical Characteristics

Between January 1, 2010, and December 31, 2014, 19,634 patients met eligibility criteria for analysis in the hemiarthroplasty DRG 469 cohort; 77,744 in the hemiarthroplasty DRG 470 cohort; 1686 in the THA DRG 469 cohort; and 9314 in the THA DRG 470 cohort. Median age ranged from 79 to 85 years and most of the patients were female (64%-76%; Table 1).

Most of the patients had a diagnosis of "unspecified" fracture of the neck of the femur ($\geq$65% across all cohorts), followed by transcervical fractures (approximately 30% for all cohorts) and pertrochanteric fractures ($\leq$5%; Table 1). Overall, most of the patients waited 1 day from admission to surgery; however, approximately one-fifth of patients in the DRG 469 cohorts waited 3 days or more. Nearly one-third of patients in the DRG 469 cohorts had preexisting diagnosis of anemia, and a quarter had history of long-term anticoagulant use (a conservative estimate—as this relies on the presence of a diagnosis code rather than pharmacy records which were not available). A large proportion of patients (9%-24%) had a history of concurrent psychosis diagnosis (alcohol or drug induced, transient and persistent unclassified mental disorders, delusional disorders, other psychoses, and pervasive developmental disorders), followed by anxiety disorder (8%-12%).

Index Hospitalization and Discharge Destination

Median interquartile range (IQR) hospital LOS was 8 (6-11) days for each DRG 469 cohort, and 5 (5-7) days for each DRG 470 cohort. More than 50% of patients in each DRG 469 cohort remained in the hospital 8 days or longer, compared to 15% in each DRG 470 cohort. Incidence of an all-cause complication was approximately 70% in each DRG 469 cohort and 14%-16% in each DRG 470 cohort. Incidence of transfusion was significantly greater among each THA cohort compared to the hemiarthroplasty cohorts ($P < .001$), ranging from 24.7% to 42.3%. Among the DRG 469 cohorts, mortality during the index hospitalization was significantly higher than the DRG 470 cohorts (17.6% vs 2.4% for hemiarthroplasty, $P < .001$; 18.6% vs 2.7% for THA, $P < .001$).